SUGAR

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In discussing "Sugar" before this Association, it will I hope, be remembered that I am a Louisianian and have spent many years of my matured manhood in the study of the sugar cane, and if therefore in my remarks I confine myself mainly to this plant, it will be another verification of the old adage that "out of the abundance of the heart, the mouth speaketh."

DEVELOPMENT OF THE INDUSTRY

The sugar industry of Louisiana began in 1794, nine years before the Louisiana Purchase. Starting with the $12,000 commercial crop of Etienne De Boré, grown upon the grounds of the present Audubon Park in 1795, the industry has expanded until it occupies a goodly portion of the South Atlantic and the Gulf coasts from South Carolina to Mexico.

In Louisiana and Texas sugar is produced in large quantities. Elsewhere syrup alone is manufactured, though near Bainbridge in Georgia, a sugar house has recently been erected for the purpose of essaying the manufacture of sugar. In spite of the many serious obstacles, the sugar cane industry has grown and expanded until the average annual output is not far from $40,000,000.

The sugar house in this time has undergone several radical transformations. De Boré's horse mill and iron kettles have, through an almost continued process of evolution and improvement, eventuated in the central factory of to-day with its ponderous mills and crusher,

or diffusion batteries, superheaters, filterpresses, triple effects, vacuum pans, centrifugals, crystallizers and granulators. One similarity remains. Once the oxen propelling the mills were fed upon the tops of the canes they were crushing; to-day, the refuse of the cane, the bagasse, constitutes the main fuel under the boilers, where steam is generated which propels the mills that crush the cane and evaporates the juice obtained therefrom. So great indeed have been the changes in our modern central factories that an ante-bellum planter would not recognize one as a sugar house at all.

The agriculture of sugar cane has kept pace with its manufacture. The old mould-board plow and home-made harrow have long ago been succeeded by the improved turn plow and revolving harrow, and these in turn have been supplanted by the disc harrow and plow. Improved labor-saving cultivators have largely displaced expensive hoe gangs, and the cane harvester now being evolved from the brain of genius is everywhere awaited as the first valuable contribution of the new century to the great sugar cane industry of the world. The "Louisiana Sugar Planters' Association" has a standing prize of $2500 for such a machine. Drainage is recognized as a prerequisite to large crops, while irrigation is appreciated by all and practiced by few. The alluvium of the Mississippi delta, once regarded as inexhaustibly fertile, is to-day manured annually with thousands of tons of tankage, cotton seed meal and acid phosphate.

These marvelous developments have been evolved from numerous and sometimes seemingly insurmountable difficulties which have attended the industry from the beginning. Floods have repeatedly inundated whole sections and destroyed thousands of acres of cane.

Pestilence "that walketh in darkness" has several times laid a heavy hand upon large districts. The Civil War almost annihilated the industry, fifteen to twenty years being required for its partial recuperation. Low prices and unreliable labor have frequently shorn the industry of its profits. Unfriendly legislation has brought the coolie-raised or bounty-fed sugars of other countries into direct competition with that grown in the South. And lastly, and perhaps the most serious obstacle of all, is the want of permanency in our national legislation, a defect inherent in our form of government which gives the people the opportunity of overturning the "powers that be" every four years. These obstacles have developed self-reliance, investigation, study and thought, and to-day Louisiana is justly esteemed the leader of the sugar cane world, and is sending words of intelligence and experience to every tropical sugar country.

This progress, wonderful as it has been in the aggregate, has been obtained through much suffering, large expenditures of money, and thorough practical and scientific experimentations. It may be truly said of Louisiana, that nearly every dollar made by the sugar planters since the war has been utilized in the improvement of their estates, and in the reconstruction and enlargement of their sugar houses, until to-day they represent, altogether, an investment of $100,000,000.

INTRODUCTION OF CANE SUGAR

Time and space forbid a detailed account of the introduction of the sugar cane into Louisiana by the Jesuits in 1751, and the many unsuccessful attempts at sugar making before 1795, the immoderate use of taffa, a rum made from the juice of the cane, and the excite-

ment and interest attending De Boré's successful attempt at commercial sugar making in 1795 which stimulated scores of planters to follow his example, thus inaugurating the sugar industry of Louisiana and the South. The names of Dubreuil, Mazan, Destrehan, Mendez, Solis, Morin and De Boré are inseparably connected with the early history of sugar cane in this state.

The first cane introduced into Louisiana was the Malabar, Bengal, or Creole variety, from which De Boré made his first crop of sugar. The Tahiti variety was introduced about 1797, and with the Creole, furnished the seed for the planters until John J. Coiron introduced the striped and purple varieties from the coast of Georgia in 1817 and 1825. These varieties soon supplanted the others and gave by their superiority an additional impulse to the sugar industry. It may not be out of place here to mention an appropriation by Congress in 1856 of $10,000 for the purpose of obtaining cuttings of sugar cane of such varieties as were best suited to the climate of the Southern states. The Commissioner of Patents, in coöperation with the Secretary of the Navy, provided two expeditions to secure these canes. One went to the Straits Settlements and brought back the Salangore variety, which was so badly rotted on arrival as to give no results.

The brig Reliance, with Mr. Townsend on board as entomologist, visited British Guiana and Venezuela with specific instructions from Commissioner Brown to bring back certain varieties found near Caracas. Mr. Glover brought back 1008 boxes early in 1857. The newspapers of that day were filled with severe arraignments of all parties engaged in the introduction of these dead and worthless canes, but Commissioner Holt in his an-

nual report for 1857, speaks of the promising condition of the canes imported into the South from Demerara which "in the end amply compensate for the trouble of introducing them." The evidence is contradictory, but it is well known to our older planters that no canes grew from either of these importations.

In 1872, Mr. P. M. LaPice on his return from Java brought back with him a white cane which now bears his name, and which is quite largely cultivated in certain localities of this state. Mr. DuChamps imported the Purple Elephant variety in 1875, and Mr. Palfrey of St. Mary parish, introduced about the same time the Bourbon variety, which locally bears his name. Mr. LeDuc, the Commissioner of Agriculture in 1877, caused to be imported from Japan a peculiar variety called Zwinga or Japanese cane. It is an excellent hardy variety, stooling well. The stalks are very small, and though of little value to the sugar planter of Louisiana, it has recently found high favor with the small farmer in Florida for the manufacture of syrup. In 1886, the Sugar Experiment Station, through the kind offices of Commissioner Coleman, began the importation of foreign canes and now has over seventy-five varieties growing upon its grounds.

All efforts, however, to increase the sugar yields by a selection and acclimation of foreign varieties have been entirely suspended by the discovery of the ability of the cane seed (hitherto deemed infertile) to germinate and produce "seedlings." Now every sugar country is producing annually thousands of seedlings and from them propagating those which promise the largest tonnage with the highest sugar content. The Sugar Experiment Station of New Orleans has experimented with a

number of these seedlings and has distributed in large quantities two of the most promising ones, no. 74 and no. 95, to the planters of this state. These seedlings are meeting with great success and hope is confidently entertained that they will ultimately supplant all other varieties and greatly increase the output of our sugar houses.

OUTPUT

It would be curious to trace the fluctuations in our sugar output since 1795. Freezes, overflows, droughts, excessive rainfalls, variations in the prices of sugar and cotton, have been some of the local disturbing influences, while national legislation has always exercised a profound effect. It may be mentioned that in 1844 and 1845, on account of the low price of cotton, the cultivation of the sugar cane was extended to the upper parishes of this state and to Mississippi. This successful extension of the sugar industry into the cotton fields alarmed the sugar planters of the coast who positively asserted that with the high tariff of 1842 on sugar and the low price of cotton, that the entire cotton belt would go into sugar culture and ruin the industry. This is the only mention in history of the objection on the part of any sugar planter to a high tariff on sugar. The average crop of Louisiana is now not far from 300,000 long tons of sugar, though the crop for the year just closing, on account of an unfavorable season, will probably be ten per cent less.

The most serious obstacles heretofore encountered by planters in the successful growing of cane sugar have been the occasional crevasses and overflows. With sugar cane, where the stalks are planted and where from two to six tons of cane per acre are required for seed, an over-

flow is often fatal to a planter. Several years will be required to grow enough cane to re-plant and re-establish the prevailing rotation on an estate, and few planters can stand such a disaster. In 1887 Congress created the Mississippi River Commission, whose duty it is to improve the navigation of the river and works connected therewith. Its duties included the construction and maintenance of levees. This action by the national government was promptly seconded and supplemented in Louisiana by the creation of levee districts, governed by levee boards with power to issue bonds, levy and collect specific taxes, and erect and maintain efficient levees. There are about a dozen of these districts in the state, and from the bonds sold and taxes collected, supplemented with appropriations from the Mississippi River Commission, the levees of the state have been rebuilt, strengthened and raised above the highest watermark known. It is believed that the day of overflows has gone.

I have already alluded to the tariff and its influence on the sugar industry. The first duty levied on sugar was in 1789, which was augmented in 1790, 1797 and 1800. These duties were imposed at a time when there were no lands within the United States suitable for sugar cane and no sugar cane was grown. In the war of 1812 the duty was five cents per pound, but was lowered to three cents in 1816. They were levied for revenue only, and the tariff of 1816 continued until the compromise act of 1832. Since that time sugar has been the foot ball of each political party and has been subjected to frequent and severe tariff changes. Since the establishment of the United States in 1789, the tariff on sugar has been changed twenty times, fluctuating

between three-quarters of a cent in 1861 and five cents during the war of 1812. From 1890 to 1893, brown sugar was admitted free, but the sugar producers were paid from one and three-quarters to two cents per pound bounty. With this exception, sugar has always been an important source of revenue to the general government, the duty averaging about two cents per pound. Permanency in national legislation is almost necessary to the continued prosperity of any industry.

THE PLANT

Sugar cane is a gigantic grass of the genus "saccharum." All cultivated varieties are classified under one species, "saccharum officinarium." Cane goes to seed in tropical countries, but the seed are small, with much adhering pappus, often infertile, and germinate with difficulty. They are never used for planting the crop, but are germinated in experimental work for originating new varieties (seedlings). The cane crop of the world is propagated by planting the stalks, as in Louisiana, or the tops of the stalks, as in many tropical countries. The stalks are made of joints and at each joint is a bud or eye, which develops by planting into a stalk. Each stalk soon tillers until a bunch of stalks is produced.

PREPARATION AND CULTIVATION

The ground is thoroughly broken with disc or mould board plows, drawn by four to eight mules. Rows from five to seven feet wide are thrown up with two-horse plows. An open furrow is made in the center of the row with a double mould board plow. Into this open furrow are deposited two to four continuous lines of canes. These are covered by a plow or cultivator, followed by hoes, and the process of planting is completed. Two to

six tons of cane are used to plant an acre. As soon as the cane begins to sprout, the rows are off-barred on each side with a two-horse plow and the dirt covering the cane is partially removed in order to hasten the process of germination. When a good stand of cane has been secured the dirt is returned, the middles of the rows are opened and the process of cultivation begins. This is accomplished with plows, cultivators and hoes, and is continued until the cane is large enough to shade its rows and prevent the growth of weeds and grass when it is laid by. The ditches are then well opened and the quarter-drains cleaned. This is the final act in cultivation. Cultivation is best accomplished by the use of cultivators, the disc to straddle the row of cane, and the "diamond toothed" to split out the middles.

Cane is planted at any time between September and April that the convenience of the planter and the weather and condition of the soil will permit. It is usually laid by in June or early in July. After "lay by" the cane grows rapidly, particularly if frequent showers at short intervals conspire with warm weather. In Louisiana the general harvest begins in October, and lasts till January. On account of the severity of our winters, cane must be harvested in the fall and early winter, or be killed by the frost. It is therefore only about eight or nine months old when worked in the sugar house.

EXTRACTION OF THE JUICE

There are two processes of extracting the juice from the cane, pressure and diffusion.

The juice from the sugar cane is usually extracted by passing the canes through heavy iron rollers driven by powerful engines. A combination of from three to nine rollers constitutes a sugar mill. The more numer-

ous the rollers, other conditions being the same, the greater the quantity of juice extracted. Many sugar houses have in front of their mills, crushers or shredders, which prepare the canes for the mill. Frequently after the canes have passed through the first set of rollers (usually three) they are saturated with water or steam and then passed through another set of rollers. By this process, known as "maceration," a larger extraction of juice is obtained. This is usually practiced in large mill houses, giving extractions of 75 to 84 per cent of juice on the weight of the cane.

The second process is by diffusion. Beets have always been treated by the diffusion process. Recently the same process has been used with sugar cane. The process, briefly, is as follows. The canes or beets are cut up into small pieces by specially designed knives and carried into large, cast-iron cells, known as diffusors. There they are treated with hot water under pressure. Ten to sixteen cells constitute a battery. The juice is driven out by force from cell to cell over fresh chips, until it contains nearly as much sugar as the natural juice in the plant, when it is drawn off and sent to the juice tanks to await the treatment described further on. When water has passed over the chips a sufficient number of times to remove nearly all the sugar (a fact determined by chemical analysis), the cell is opened from its lower end and its contents dropped on a carrier, which conveys them away. When the cell is again closed below it is at once refilled with fresh chips from the top. In the continuous march of diffusion work, one cell is being emptied and one being filled all the time, the rest being filled with chips and closed, subject to the constant flow of juice. To each cell is attached a heater or "calorisa-

tor," and through this the juice is made to flow in its passage from cell to cell.

CLARIFICATION

The juice obtained is subjected to the following treatment. If white or yellow sugar be desired the juice is treated with the gas obtained by burning sulphur. This bleaches it. It is then drawn into large copper vessels, holding from 400 to 1500 gallons, with steam coils at the bottom, called "clarifiers." Here it is treated with milk of lime until the acidity of the juice is neutralized, and then it is heated nearly to the boiling point of water. This treatment brings to the surface a heavy blanket of impurities which is brushed off into another receptacle and finally sent into a filter press, where the juice is expressed and the solid impurities remain imprisoned between the plates of the press. When the filter press is full of this solid substance, it is emptied and made ready for fresh work. Superheated-clarifiers are used in many factories.

After cleaning, the juice is evaporated quickly to a syrup containing about 40 per cent of sugar. This evaporation is performed in open pans, or in closed vessels, in each of which a partial vacuum is maintained. Direct steam is used in the former, while exhaust steam from the engines, pumps, etc., serves the latter. These closed vessels are called "effects," single, double, triple, or quadruple, according to the number used. The principle is this: exhaust steam is made to boil the juice in the first vessel where 10 to 15 degees of vacuum (20 to 15 degrees of pressure) are maintained; the vapors from the first vessel are made to heat the juice in the second vessel where a vacuum of 25 to 28 degrees is held, etc. The vacuum in each vessel can be regulated at the

pleasure of the operator, according to the number of vessels used. By this process the evaporation is performed at a minimum expense and at a temperature considerably below the boiling point of water, thus escaping the danger of caramelizing sugar, a thing frequently done in open vessels at high temperature.

By either of these processes a syrup is obtained which is sent to the vacuum strike pan where it is granulated. This pan consists of a closed vessel with three or more interior coils, situated one above the other, through which the steam may circulate. To this pan is attached a vacuum pump, which removes the air and vapor from the pan as fast as formed. The vapor is then condensed by a constant stream of water flowing through the pump. When the proper vacuum is obtained, usually 26 to 28 degrees, the syrup maker takes his first charge of syrup, turns heat into his lowest coil, and begins again the process of evaporation. By gradual charges enough syrup is concentrated to begin the formation of the grain. As the pan is filled, the different coils are opened and additional steam turned on. After concentrating the syrup to a sufficient density small grains begin to appear. These are examined at short intervals by removing a small quantity on a proof-stick, and when sufficiently numerous, the process of building the grain begins. This is done by carefully feeding them with fresh syrup taken in, in small quantities, at short intervals. Finally the grain has grown to the proper size, the pan is full, and a strike must be made. Before the latter is performed full heat is turned in on all the coils, the grains are hardened and the entire mass cooked to the proper density. Then the bottom of the pan is opened and the stiff semi-fluid mixture of sugar

and molasses, called "masse cuite" is emptied into a large mixer, where revolving paddles keep it from solidifying. From this mixer it is drawn into centrifugals which, revolving at the rate of 1200 to 1500 times per minute, throw out through the fine sieves the fluid molasses and retain the sugar.

The molasses is caught in the lower basket and directed to a large receiving tank. After the molasses has been removed the sugar is washed with more or less water, or pure sugar syrup, according to the quality of sugar desired. In this way brown, yellow clarified or white sugar may be obtained, at the option of the operator. These are called first sugars. Frequently, when yellow clarified sugar is desired, the wash water contains a small quantity of some salt of tin to give the sugar a desirable yellow tint.

The yellow clarified and white sugars thus made go at once into commerce. Sometimes the latter is granulated before offering it on the market. The instrument used is called a granulator and consists of a large, hollow revolving cyliuder, so arranged that the sugar conveyed into it at one end is carried slowly through it, and during its passage is heated to expel the last trace of moisture. It emerges as granulated sugar and has the advantage of not caking, even in the dampest climate. The brown sugar made as above, formerly went into consumption as such, but now goes almost entirely to the refinery.

The molasses thrown off by the centrifugals, in the above operation, is drawn up again into the vacuum pan and cooked either to grain with fresh syrup and centrifugaled, or to such a density that when a small portion of it is drawn between the thumb and finger it

will string out into a fine thread before breaking. When this density is obtained the mass is emptied either into crystallizers stirred by paddles, where it grains quickly, or into iron wagons and rolled into a hot room, where a constant temperature of 110° to 115° F. aids the granulation of the contained sugar. This process is called cooking to "string" and its sugar "string sugars," in contradistinction to "grain" and "grained sugars." In a few days the mass, either in the crystallizers or in hot room, becomes charged with crystals and the latter are separated by centrifugals. It is almost impossible to obtain other than brown sugars by this process, and of course they go to the refineries. They are known as "second sugars" or "seconds." The molasses from the second sugars is again subjected to the same treatment, and the sugars therefrom are called "third" sugars or "thirds." Sometimes "fourths" are made. The final molasses finds its way to the markets either in barrels or in tank cars under the name of centrifugal molasses. It is black, thick and uninviting, containing but little sugar, and possessing very little value.

"OPEN-KETTLE" FACTORIES

Unfortunately not all of our factories are so advanced. The open-kettle sugar house still exists, although the number is gradually diminishing. The methods of extraction of juice by mills is similar to that described above. It is evaporated differently. Four large iron kettles arranged in a line, encased in brick, with a continuous furnace under them, constitute the outfit. These kettles, descending in regular order in size, are known as the "grande," the "flambeau," the "sirop," and the "batterie." The juice, after being sulphured,

is drawn into the grande, where it is limed, heated and the scums removed. It is then dipped into the flambeau, where it is brushed and cleaned, then passed to the sirop, where it is further brushed, and finally into the batterie, where it is concentrated to the granulating point—a density of about 45°–50° Baume, and with a temperature of about 240° F. At this point it is dipped out and run into long troughs, called coolers, placed in the purgery. In a few days this "masse cuite" becomes solid, and preparations are then made for "potting." This process is as follows. In every open-kettle sugar house is a room called the "purgery." The floor of this room is cemented and inclines from every direction toward a large cemented cavity known as the molasses cistern. In this room the potting is done. Empty hogsheads are brought in and three one-inch sugar holes are bored into each bottom. Into each hole is inserted a large stalk of cane with the end cut in the shape of a trianglar prism and its sides beveled. After placing the hogsheads in position they are filled with the "masse cuite" from the coolers. By the aid of spades and shovels the "masse cuite" is dug up, the lumps pulverized and transferred to the hogshead. The molasses following the beveled edges of the canes percolates downward and emerging through the auger holes in the bottom, flows over the cemented floor into the molasses cistern. In a few weeks the sugar is drained of its molasses. The hogshead of sugar is headed up and shipped off to market. Little or none of this sugar now reaches the consumer. It is sold to the refineries.

It is not so with the molasses. If the operations have been carefully performed the molasses is excellent and commands fairly remunerative prices. It is called

"open-kettle molasses" and is held in high esteem. Sometimes a small well is dug into the solid mass of the cooler. Into this well percolates the molasses which is dipped out as fast as it accumulates. This molasses is called "bleedings," and is in large request at high prices. But little, however, is made.

Another product of the open-kettle sugar house is syrup or "sirop de batterie." This is the well clarified juice concentrated to a syrup in the batterie or last kettle, in which ordinarily the strike sugar is made. It is highly esteemed and early in the season brings extravagant prices.

Popular error exists as to the terms molasses and syrup. The former refers always to the drainings from the sugar, while the latter is the concentrated juice of the cane with all the sugar in it. The former will not easily ferment or crystallize, and therefore can be kept for a long time. The latter, if too concentrated, will granulate, and if too thin will ferment. It therefore cannot be kept a very long time without sterilization.

Often instead of evaporating the juice in kettles heated from underneath by an open fire, a series of pans are arranged, each with steam coils in the bottom. The juice is clarified and brushed in the first and concentrated in the remainder, the last one of which is the "strike pan." These are called steam trains.

GRADES

We have considered the usual products manufactured by the sugar houses directly from the raw material. These products are shipped to market and sold either for consumption or for refining. Nearly all of the open-kettle and the second and third centrifugal sugars go to the refiners, little or none going directly into the

trade. On the other hand, nearly all of the first centrifugal sugars go directly into commerce, provided they have been properly washed, and are sold for consumption to our groceries.

On the Sugar Exchange in New Orleans the following classifications have been adopted for plantation products. For centrifugal sugar: "plantation granulated," "off granulated," "choice white," "gray white," "fancy yellow," "choice yellows," "prime yellows," "off yellows," "seconds." For open-kettle sugars: "choice," "strictly prime," "prime," "fully fair," "good fair," "fair," "good common," "common inferior." For both open-kettle and centrifugal molasses: "fancy choice," "strict prime," "good prime," "prime," "good fair," "fair," "good common," "common," "inferior."

Color alone determined the above classification, and until recent years was the only factor which gave value to the sugars, syrups or molasses. Now everything destined for the refineries is subject to polariscopic tests and the percentage of sugar therein is the ruling factor. Open-kettle sugar rarely surpasses 90 degrees polariscopic tests and seldom falls below 80 degrees, while first centrifugal sugars rarely fall below 90 degrees and sometimes go over 99 degrees. Chemically pure sugar gives 100 degrees. Syrup, when bought by the refinery, and molasses when bought by the distillery, are both subjected to chemical analyses which determine their values.

HOW PACKED

All centrifugal sugars of every grade are packed in barrels holding about 350 pounds, while open-kettle potted sugars are shipped in hogsheads holding from 1000 to 1500 pounds. Molasses and syrups are sent to

the consumers in barrels holding about 50 gallons each. To dealers, molasses is often shipped in tanks located on a flat-car. It is pumped into the tanks from the sugar houses, and pumped from the tanks into large cisterns when received at its destination.

MIXING AND BLEACHING MOLASSES

A large trade is carried on in mixing glucose syrup, made from corn, with Louisiana molasses. This mixture is sometimes branded "Louisiana syrup" or "molasses." So great has become this industry that it is difficult to buy a brand of pure Louisiana molasses, except from first hands on the levees.

Brightening dark molasses has also become quite a business in some quarters, and specially prepared chemicals are sold for the purpose. Much of the black centrifugal molasses is thus bleached and sent into the market at higher prices. This will continue despite the laws against it, just so long as the trade buys its goods on color. Thanks to the prevailing low prices, little or no adulteration can now be found in the sugars of commerce.

CONDITIONS AND PROSPECTS FOR CANE SUGAR

Taking a retrospective view of the sugar industry of Louisiana for the last fifteen or twenty years, it can be said with truth that there is no industry in the world that has made such progress. The organization of the Sugar Planters' Association in 1877, may be regarded as the starting point of the renaissance of the sugar industry. Since that time the Sugar Experiment Station has been established, whose teachings and experiments have illuminated the field and the factory. The *Louisiana Planter and Sugar Manufacturer* has been

started, whose weekly visit to the home of every planter, manager, overseer, and sugarmaker, carries with it information upon every subject pertaining to the agriculture of sugar cane and the chemistry and manufacture of sugar. The Sugar Exchange has been created in New Orleans, where the products of the plantations are quickly sold.

Small sugar houses are fast disappearing, and enormous factories with every modern labor and fuel saving apparatus, are to be found in every section. The output of sugar, both per acre and per ton of cane, has been greatly increased.

The crop of 1902 brought about $30,000,000, and gave employment directly and indirectly to nearly half a million of people. Every dollar received was exchanged for labor, material, provisions and clothes. This large sum is paid out as fast as received, and a portion of it doubtless finds its way to every state in the Union, thus creating an inter-state commerce of nearly $60,000,000.

The Brussels convention, by abolishing the export bounties and cartels, has caused a reduction of the European beet sugar output. With the abolition of the bounties has come also a reduction in the internal revenue charges on sugar in several countries, with a consequent increase in domestic consumption. It is reported that the European beet sugar crop of this year is 1,000,000 tons below that of its predecessor. The menace to the cane sugar interests which previously existed in Europe's beet sugar surplus, has been materially modified. Hamburg no longer fixes the price of sugar in the American markets. The advantage hoped for through this reduced production and increased con-

sumption in Europe, has been largely destroyed by a notable increase in the production of cane sugar in the tropics, particularly in Cuba.

The United States must take this surplus of cane sugar, and hence our markets are not yet materially affected. Despite the reciprocity treaty now in full effect, January deliveries of raw sugar from Cuba are offered at 2.15 cents per pound, as against 2.06 of last February. The United States will consume this year 2,650,000 tons, of which about 1,000,000 will be furnished by domestic sources. The cane sugar of the tropics will more than supply the remainder.

One fact, however, is patent. The supremacy of European beet sugar is gone. Cane sugar under scientific and systematic direction has regained its sway and will doubtless hold it until the end of time.